



Characterization of Pleurotinae, with review of *Pleurota* species close to *P. aristella* (Linnaeus) from Morocco (Lepidoptera: Gelechioidea: Oecophoridae)

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Abstract

Morphological traits characterizing and delimiting Pleurotinae (Oecophoridae) are provided and discussed. The evidence supports the validity of the subfamily as suggested by recent molecular studies. The *Pleurota aristella* (Linnaeus, 1767) species group is characterized, and six new species belonging to the group from Morocco are described: *Pleurota tricolor* Tabell, **sp. nov.**, *P. pellicolor* Tabell, **sp. nov.**, *P. lacteella* Tabell, **sp. nov.**, *P. moroccoensis* Tabell, **sp. nov.**, *P. ochreo-palpella* Tabell, **sp. nov.**, and *P. atlasensis* Tabell, **sp. nov.** Habitus images and label data are provided for the types of *P. goundafella* Zerny, 1935; *P. insignella* Zerny, 1935; *P. ochreostrigella* Baker, 1885; *P. macrosella* Rebel, 1900; *P. stain-toniella* Baker, 1888; *P. mauretanica* Baker, 1888; and *P. algeriella* Baker, 1885. DNA barcodes of the new species are compared with all available Pleurotinae sequences (BIN n = 117) in BOLD.

Key words: apomorphy, DNA barcoding, genital morphology, *Pleurota aristella* species group, wing pattern elements, new species

Introduction

Pleurotinae was established by Toll (1956) as a separate subfamily in Oecophoridae (Gelechioidea). The separation from the rest of Oecophoridae as understood then (cf. Bucheli 2009) was based on the characteristic shape of the labial palps as well as differences in genitalia. Toll based the new subfamily on five genera: *Aplota* Stephens, 1834, *Pleurota* Hübner, 1828, *Macrochila* Stephens, 1829, *Topeutis* Hübner, 1825, and *Holoscolia* Zeller, 1839. Back (1973) followed this concept, but later the status of Pleurotinae as a separate subfamily was not widely accepted. For instance, Leraut (1992) supported its status as a separate subfamily, though with a quite different concept, e.g., including many Australian taxa. A similar conclusion was drawn by Kaila (2004) on the basis of a systematic analysis of the morphology on the whole Gelechioidea. In the voluminous treatment of Australian Oecophorinae, Common (1990), however, did not mention the occurrence of Pleurotinae in Australia, and later he (Common 1997, 2000) removed Australian species ascribed to *Pleurota* from this genus one by one, but did not explicitly indicate an opinion on the status of this putative subfamily. Fetz (1994) gave a thorough review of the status of *Pleurota* and allied genera up to that time. Hodges (1998) did not recognize Pleurotinae, nor did Nieukerken *et al.* (2011), while Lvovsky (2006) supported the status of Pleurotinae as a valid subfamily. Recently, support for its status as the sister group of remaining Oecophoridae, with also its own synapomorphies, has gained support in those analytical, usually DNA-based works where it has been included (Kaila *et al.* 2011, Heikkilä *et al.* 2014 and Kim *et al.* 2016). In the family classification of Gelechioidea, Heikkilä *et al.* (2014) recognized Pleurotinae as a valid subfamily of Oecophoridae. It currently comprises five genera: *Minetia* Leraut, 1991; *Pleurota* Hübner comprising three

subgenera: *Pleurota* Hübner, *Macropalpula* Lvovsky, 1992 and *Protasis* Herrich-Schäffer, 1853; *Holoscolia* Zeller, 1839; *Aplota* Stephens (Tokár *et al.*, 2005); and *Pleurotopsis* Amsel, 1955. In this paper, we do not evaluate the validity of these genera, although preliminary genetic studies hint that some of them might eventually be relegated to synonymy.

Pleurotinae species are generally characterized by long and porrect labial palpi that are densely covered by long, piliform scales. This trait is, however, found in several other oecophorine genera (Common 1990, 1997, 2000), as well as in other gelechioid families such as several subfamilies of Autostichidae (Gozmány 2000, 2008, treating Symmocinae and Holcopogoninae as distinct families) and Gelechiidae (e.g., Hodges 1986). Diagnostic characters and putative synapomorphies are provided in the *Material and Methods* section below. The only comprehensive review of Palearctic *Pleurota* is a monograph by Back (1973) which comprises several descriptions of new species and subspecies. Unfortunately, five taxa belonging to the subgenus *Protasis* were not treated, and several other *Pleurota* taxa are lacking any illustrations. Subsequently, new species have been described mainly from the former Soviet Union area by Lvovsky (1984, 1990, 1992, 2007). Despite the work by Back (1973), Pleurotinae have received surprisingly little attention in the western Palearctic region. Only three species, *P. gallicella* Huemer & Luquet, 1995 from France, *P. castagniccia* Varenne & Nel, 2013 from Corsica, and *P. uygar* Kemal & Koçak, 2017 from Turkey have been described since Back's work, and one species, *Holoscolia huebneri* Koçak, 1980, renamed.

One obvious reason for this situation is that the quality of the pictures in Back's dissertation is not adequate to make confident species identifications. This applies, in particular, to the illustrations of female genitalia, which are more or less unusable. Another possible reason is that, in spite of their colorfulness and occasional abundance, Pleurotinae are considered a difficult and challenging group, which has diminished their attractiveness. Besides the work by Back (1973), the only available identification tool on Pleurotinae is the book on Central European Oecophoridae (Tokár *et al.* 2005), in which 24 pleurotine taxa known from Central Europe and adjacent countries are illustrated.

The subfamily Pleurotinae has a Palearctic distribution, with one Nearctic species, *P. albastrigulella* (Kearfott, 1907). The diversity is especially rich in the southern Mediterranean region, and diminishes sharply eastward, so that only three species have been reported from China so far (Wang & Li 2003). In Morocco, the Pleurotinae fauna is poorly known, and only about ten species have been recorded, all belonging to the genus *Pleurota*. Many species described from Morocco and adjacent countries have not been recorded since their original descriptions, and new material has been scarce or remained unstudied until now. Recent collecting trips to Morocco, carried out by the last author, Jaakko Kullberg and Danish expeditions, have produced many specimens of *Pleurota*, revealing that the pleurotine fauna is much more diverse than previously known. As a demonstration of this, six new species close to *P. aristella* are described here.

This is the first publication in a proposed series of papers dedicated to taxonomic revision of the Palearctic species of Pleurotinae (Oecophoridae). The specific epithets of the new species are nouns in apposition.

Material and methods

Collection Abbreviations

MZH = Finnish Museum of Natural History of Helsinki, Finland

NHMUK = Natural History Museum, London, United Kingdom

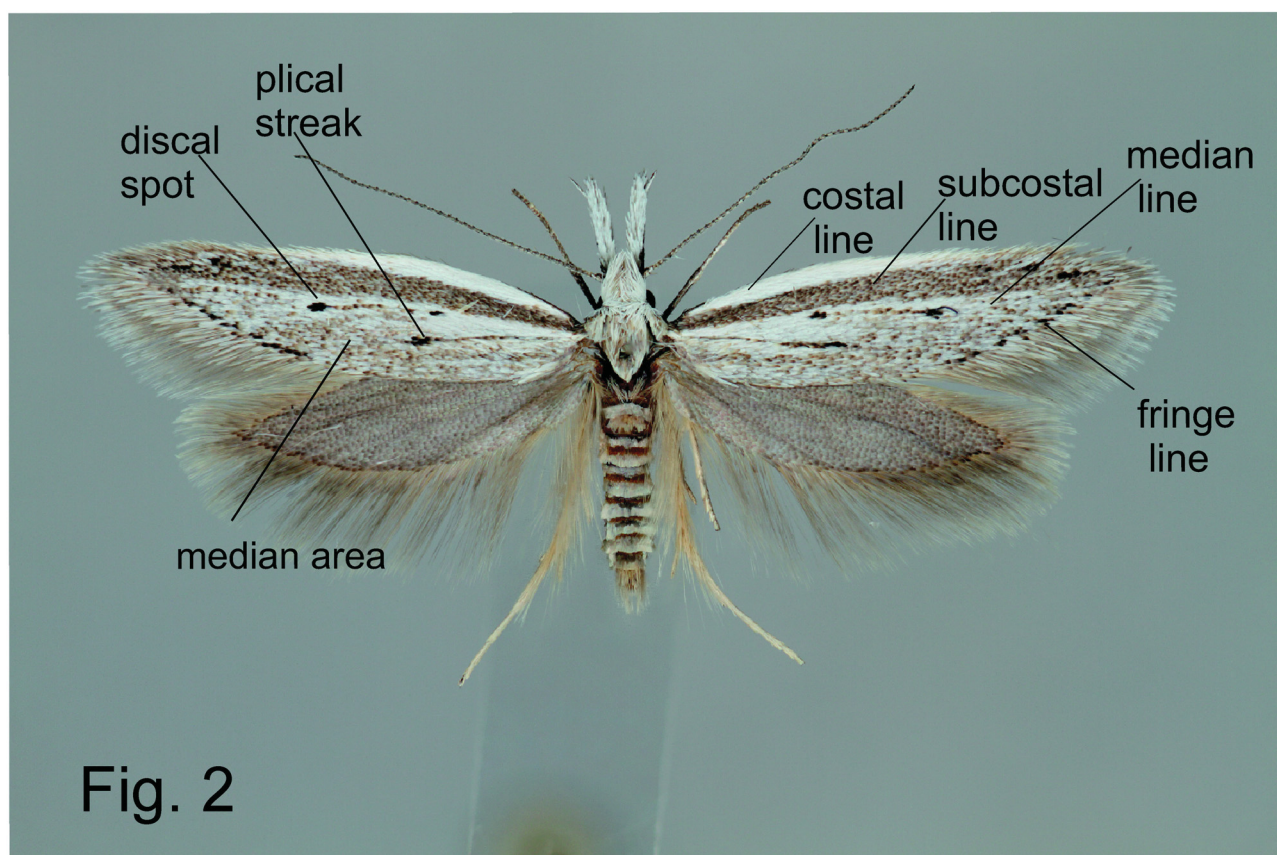
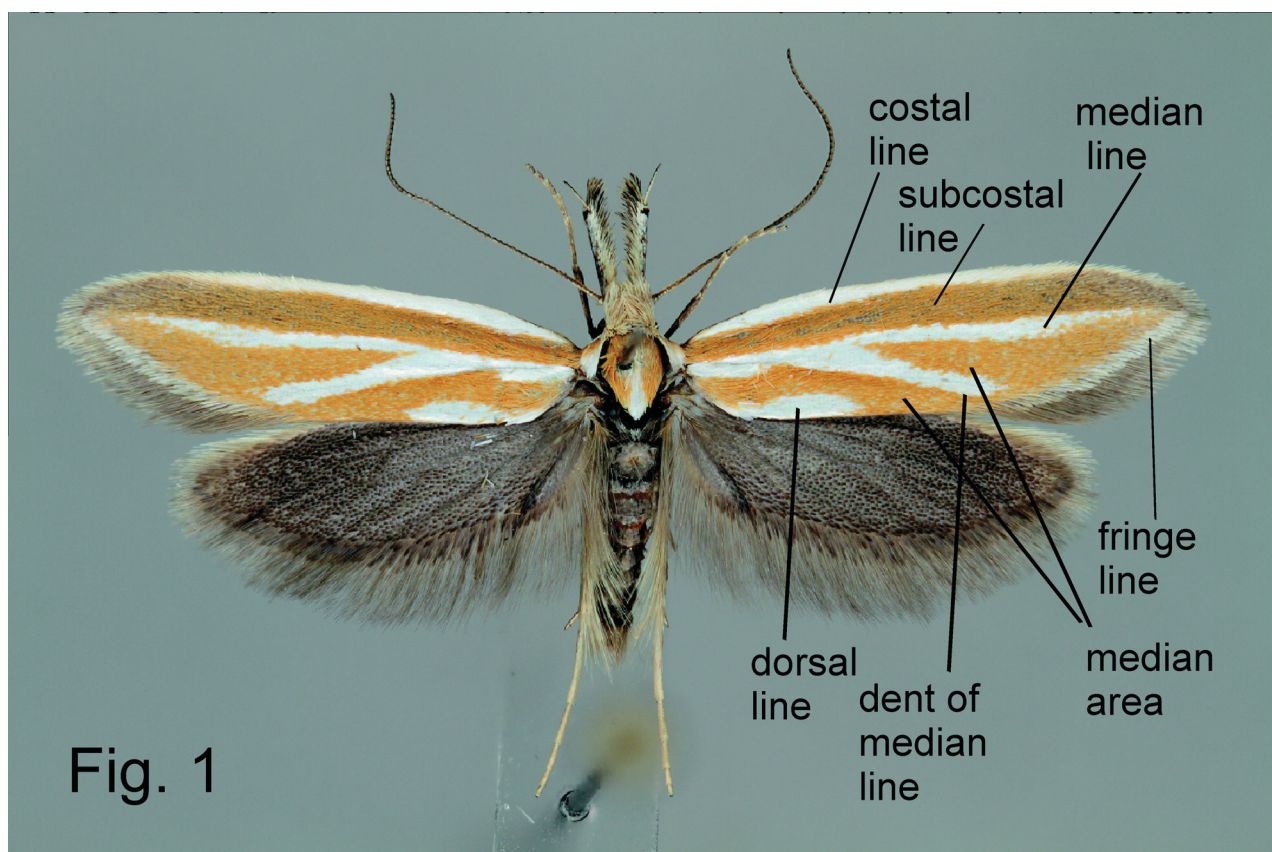
NHMW = Natural History Museum, Vienna, Austria

ZMUC = Zoological Museum of Copenhagen, Denmark

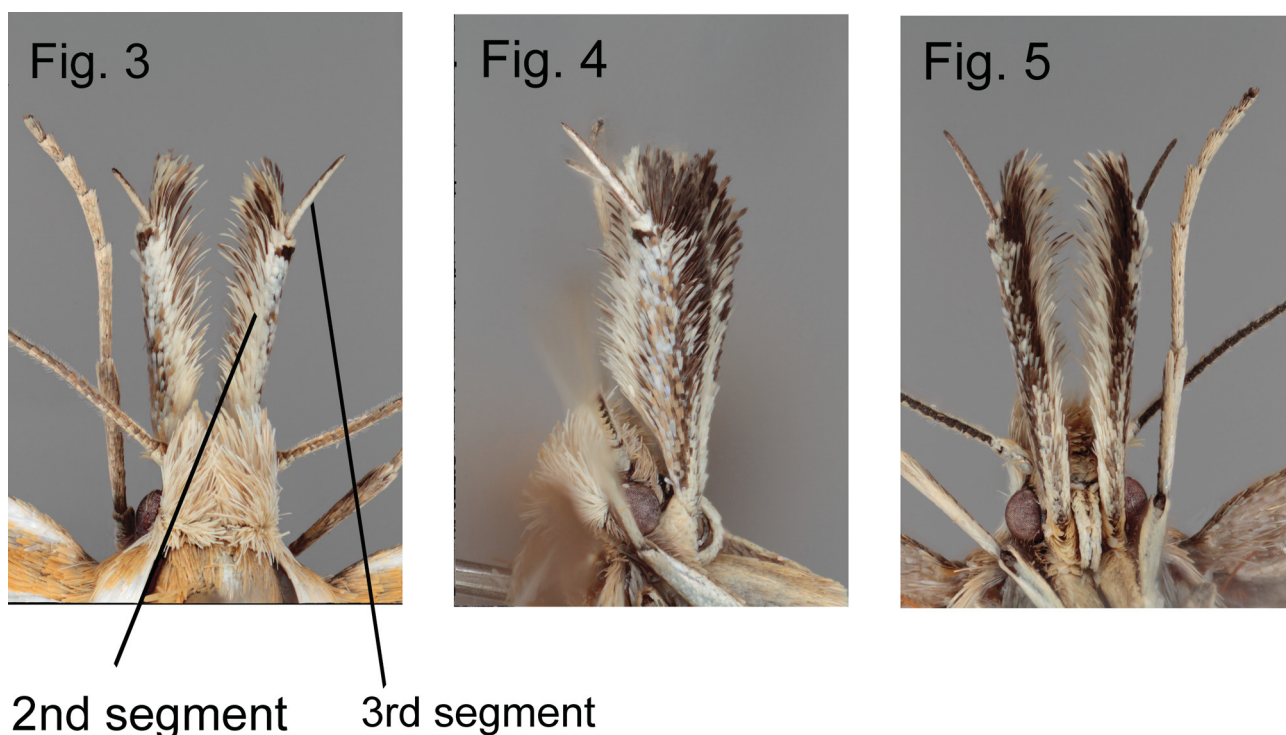
TAB = Research collection of Jukka Tabell, Hartola, Finland

Terminology and notes on anatomy

We use standardized terminology for wing pattern as shown in Figs. 1–2. The naming of the wing pattern elements are derived from their position of the wing, with no suggested anatomic interpretation. The male genitalia (Fig. 6) show some peculiarities. The structure referred to as “valval lobe” appears to be a modification of the transtilla. The lobes are interconnected dorsad of the phallus with varying level of sclerotization; often it is membranous and thus hard to decipher. The lobe is connected to a varying extent to the base of the valva. The juxta



FIGURES 1–2. Terminology used for forewing pattern elements.



FIGURES 3–5. Labial palpi. Length of segment 2 is given in the text with scales included. 3. Dorsal view. 4. Lateral view. 5. Ventral view.

is a narrow sclerotization that extends almost or to the vinculum—an unusual condition within Gelechioidea, otherwise recorded in hypertrophine Depressariidae where the extension is connected to the vinculum (Kaila 2004). The juxta has a pair of posterior lobes that are often very long and narrow. This characterizes all pleurotines.

Within the species of the *P. aristella* group, female genitalia (Fig. 7) have a long, telescopic ovipositor formed of segments 8 to 10. The segments are membranous on both sides and fused together without clear edges; thus their lengths are difficult to assess in permanent slides. The 8th segment contains a ventral longitudinal median sclerotization, and dorsolateral narrow sclerotized bands formed from extensions of the apophyses anteriores. Another synapomorphy is a branching of the apophysis anterioris. In some species the branches are separated, in some apically fused together, thus forming a dorsal support for the ostium bursae, even so that in the *P. bicostella* group it forms a band whose homology with the branch of apophysis anterioris would be nearly impossible to decipher were it not for the availability of a wide array of pleurotine species showing intermediate shapes. The shape of the female signum is characteristic: a bent, transverse sclerotization with a pair of anteriorly directed teeth. Almost without exception, all species also have a pair of smaller signa close to the inception of the ductus bursae. Apart from the telescopic ovipositor, these male and female genital traits are to our knowledge unique synapomorphies for Pleurotinae.

Material

We examined over 90 specimens of Moroccan *Pleurota*. Furthermore, photos of adults and genitalia of several type specimens housed in NHMUK and NHMW were studied, kindly sent us by Dr. David Lees and Dr. Sabine Gaal. Photos of our adult specimens were taken with a Canon EOS 7D, MP-E 65mm f/2.8 Macro & EF 100mm f/2.8 L IS USM Macro. Focus stacking was done with Cognisys StackShot and Helicon Focus 6.7.1, and final image editing with Adobe Photoshop CS5.1. The genitalia preparations were made following standard techniques (Robinson 1976), but the male genitalia were not stained. The genitalia were photographed in ventral view with a Leica DM1000 microscope and integrated Leica DF295 digital camera. Some taxa were photographed in 2–6 images of different depth of focus and combined into single images using image-stacking software as implemented in Photoshop CS6.0. Final plates were compiled with CorelDraw 2017.

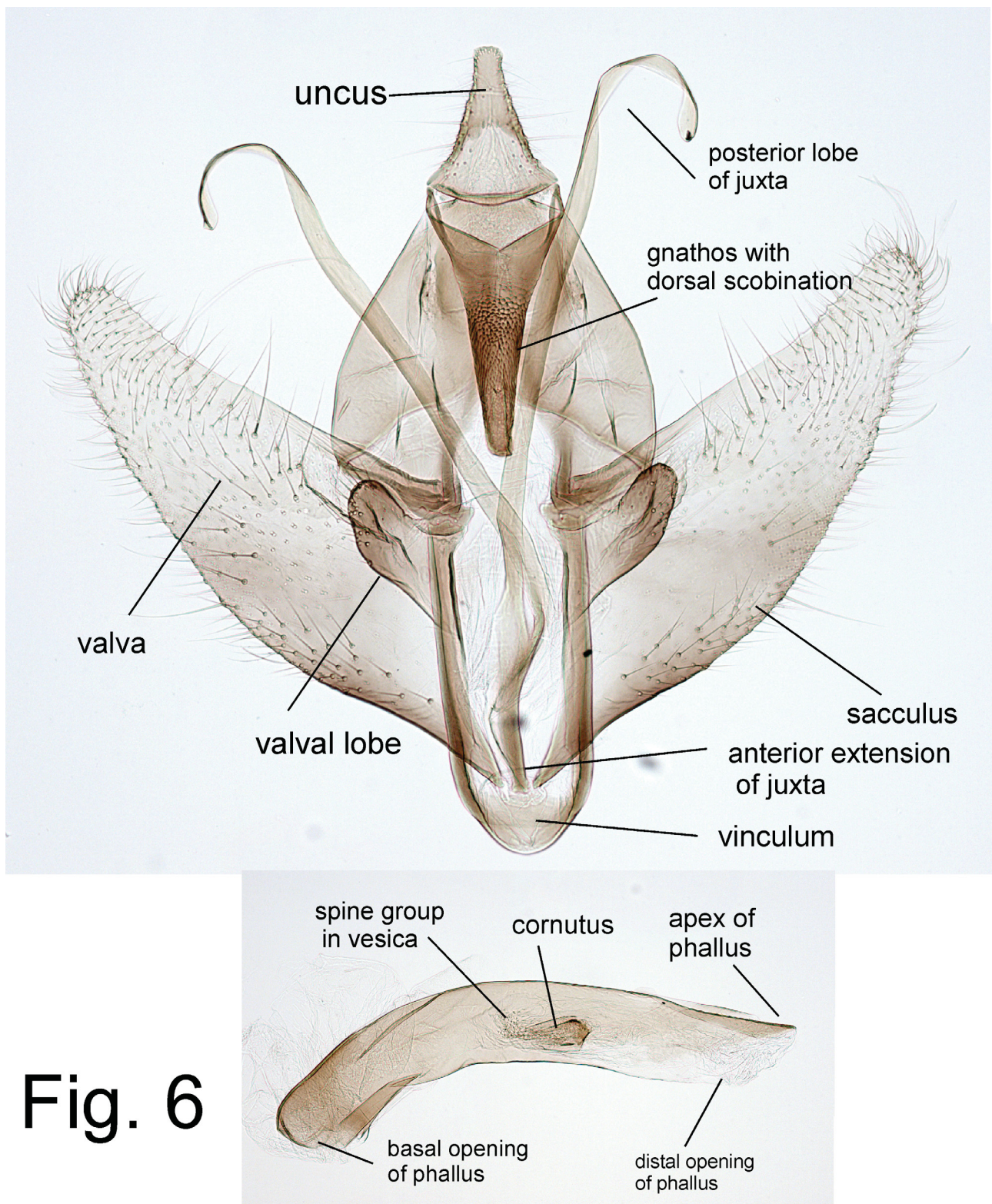


FIGURE 6. Terminology of male genitalia, phallus separately below, not in same scale. Anatomical elaboration of some structures is given in the text.

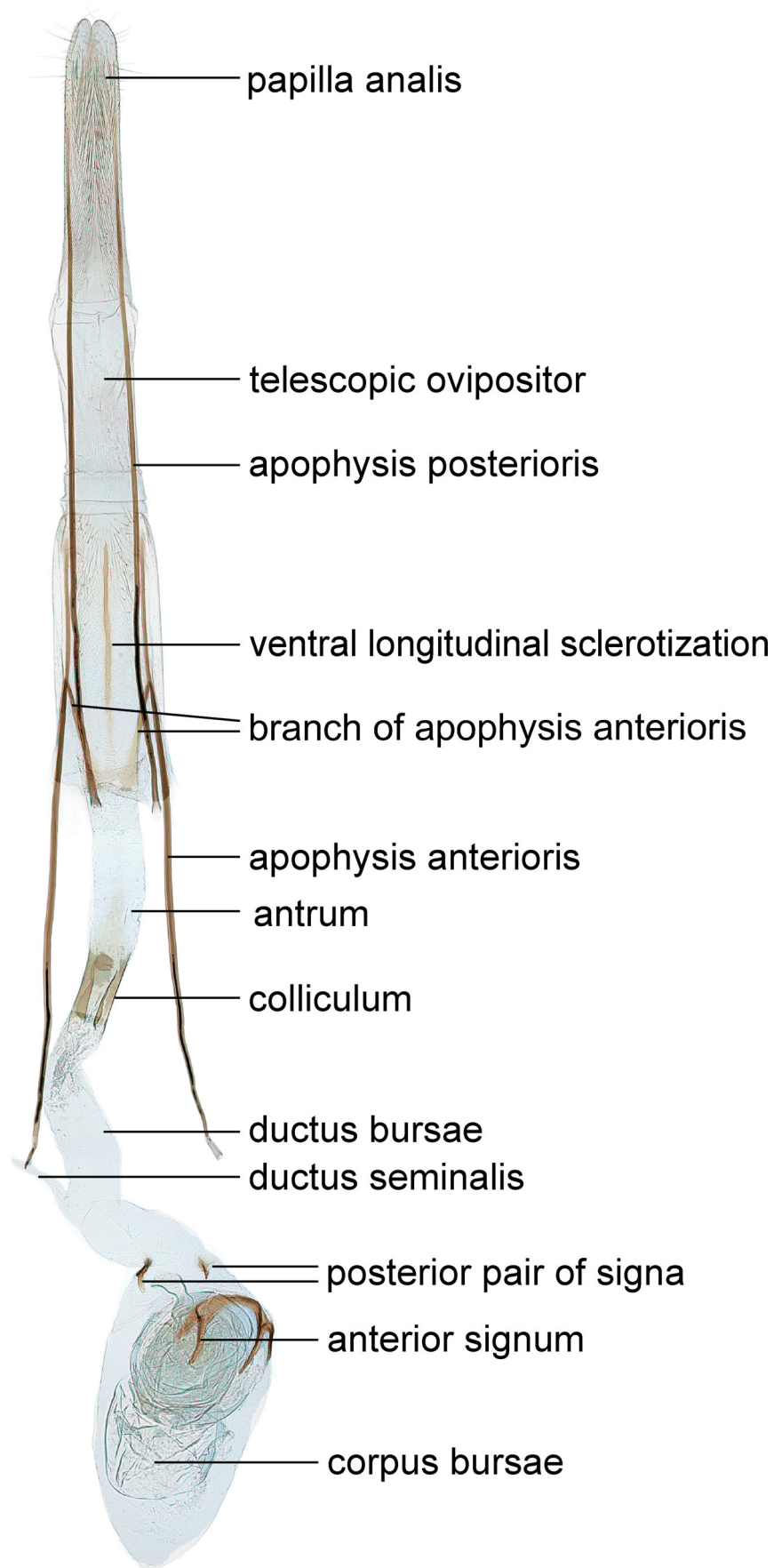


FIGURE 7. Terminology of female genitalia. Some structures are elaborated in the text.

A part of the material was subjected to DNA barcoding (sequencing of the 658 bp fragment of the mitochondrial COI gene) for preliminary detection of genetically distinct taxa and for obtaining molecular data for new species. The DNA barcodes were compared to all Pleurotinae BINs (n = 117) available to us in BOLD. The K2P divergences between the examined taxa were calculated using analytical tools in BOLD systems v. 4.0 (<http://www.boldsystems.org>), and the results are presented in Table 1. A neighbor-joining tree (Fig. 48) was constructed using MEGA 7 (Kumar *et al.* 2016). Details of successfully sequenced voucher specimens, including voucher data and images, are publicly available through the dataset DS-PEMOR at www.boldsystems.org and at [dx.doi.org/10.5883/DS-PEMOR](https://doi.org/10.5883/DS-PEMOR).

Technical notes

The posterior lobes of juxta are easily curled apically when dissecting the male genitalia. This is an artefact and not feature usable in distinguishing species.

The collecting data of studied material involves different practices to indicate the coordinates. The coordinates are presented as they are written in the collecting labels.

Characterization of the *P. aristella* s. l. species complex

Adults of the species here placed in the *Pleurota aristella* group are medium to large-sized, usually ochre to brown with white costal and median lines. Labial palpi are long, often with a lateral blackish brown spot at the junction of the 2nd and 3rd segments. Male genitalia are characterized by the laterally compressed, downwards directed gnathos with scobination on dorsal side. Basal arms of the gnathos are fused to the tegumen without distinct limit. The valva is elongated and upwards oblique, valval lobes are well-developed, and posterior lobes of juxta are very long (for their anatomy, see above). In the female genitalia, long apophyses, a median sclerotization in the ovipositor, and long branches of the anterior apophyses are characteristic.

According to Back (1973), the *P. aristella* species group comprises 13 species and three subspecies (numbers 36–48 in his work). The exact placement of a few further species is unclear, and several additional names are considered as junior subjective synonyms in his work. In our opinion, the synonymies should be revised, because preliminary morphological and genetic studies show that there are obvious differences among many synonymized taxa, which therefore should be treated as valid species. For example, *P. bitrabicella* (Germar, 1817), synonymized with *P. aristella* by Back (1973), is markedly distinct both genetically and morphologically from *P. aristella* (see Fig. 48). Later on, Lvovsky (1992) added *P. christophi* from Russia and Varenne & Nel (2013) *P. castagniccia* from Corsica to this species group. In the latter case the authors did not study the two previously reported Corsican taxa, *P. breviella* Constant, 1885 and *P. bistriella* Constant, 1885, both names associated with *P. aristella* (Back 1973; Tokár *et al.* 2005).

According to Back (1973), two species of the *P. aristella* species group occur in Morocco: *P. argodonta* Meyrick, 1913 and *P. macrosella* Rebel, 1900 (Fig. 28). The species were described from Tunisia and Algeria, respectively, and their occurrence in Morocco needs re-examination. We accommodate into this species group the Moroccan species *P. insignella* Zerny, 1935 (Fig. 24) and *P. goundafella* Zerny, 1935 (Figs. 10, 22), and an Algerian species, *P. staintoniella* Baker, 1888 (Figs. 20–21, 30), based on similarities in their genital structures.

Taxonomy

Key to Moroccan species of *P. aristella* species group

The key is based exclusively on characters in external habitus. Forewing markings and coloration, and the lengths of palp segments of labial palpus are usually adequate for correct determination. In unclear cases, e.g., if the specimen is worn, the identifications should be confirmed by the genitalia.

1.	White costal line absent or indistinct	2
-	White costal line distinct	5
2.	Forewing pale yellow	<i>P. goundafella</i>
-	Forewing ochre, brown or grey	3
3.	Forewing ochre	<i>P. pellicolor</i>
-	Forewing brown or grey	4
4.	Forewing brownish grey, wingspan greater than 25 mm	<i>P. insignella</i>
-	Forewing brown, wingspan less than 21 mm	<i>P. tricolor</i>
5.	Costal and dorsal half of forewing of same colour	<i>P. staintoniella</i>
-	Subcostal line darker than remainder of forewing	6
6.	Apical part of forewing with white longitudinal lines, white median line broad	<i>P. lacteella</i>
-	Apical part of forewing without distinct lines	7
7.	Forewing costa slightly bulged basally	<i>P. atlasensis</i>
-	Forewing costa evenly curved	8
8.	Third segment of labial palp thick in male, 0.37 x length of segments 1 and 2	<i>P. ochreopalpella</i>
-	Third segment of labial palp delicate in male, 0.34 x length of segments 1 and 2	<i>P. moroccoensis</i>

***Pleurota tricolor* Tabell, sp. nov.**

Barcode Index Number: BOLD:ADA1655

Table 1, Figs. 8, 9, 36, 48

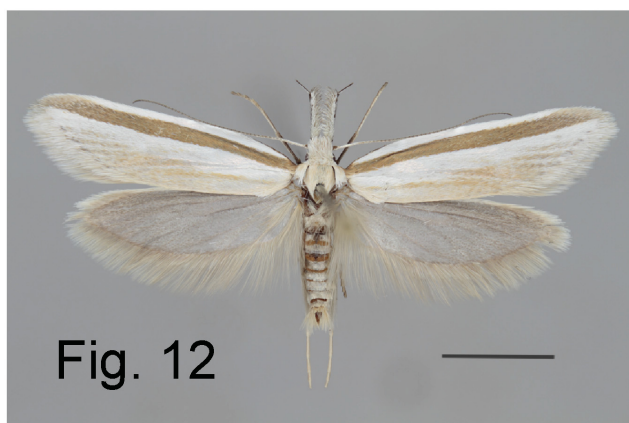
Type material. Holotype ♂: Morocco, Al Haouz Prov., 3 km NE Asni, 1120 m, N31.27056 W7.96586, 30.VI.2016, J. Tabell *leg.* (coll. MZH). Paratypes: 8 ♂ (DNA sample 25598 Lepid Phyl; DNA sample 25614 Lepid Phyl), same collecting data as holotype (colls. MZH and TAB); 2 ♂ (GP 5714 J. Tabell, DNA sample 25594 Lepid Phyl; DNA sample 25612 Lepid Phyl), Morocco, Al Haouz Prov., 2.5 km NE Asni, 1120 m, N31.26526 W7.96847, 30.VI.2016, J. Tabell *leg.* (coll. TAB); 1 ♂ (GP 5506 J. Tabell, DNA sample 24616 Lepid Phyl), Morocco, High Atlas, 9 km NW Ouirgane, N31°12'24'' W8°4'33'', 30.V.–3.VI.2015, 970 m, C. Hviid, O. Karsholt & K. Larsen (coll. TAB); 2 ♂ (DNA sample 24617 Lepid Phyl; DNA sample 24618 Lepid Phyl), Morocco, High Atlas, 6 km NW Ouirgane, N31°12'32'' W8°4'48'', 30.V.2015, 850 m, C. Hviid, O. Karsholt & K. Larsen (colls. ZMUC and TAB).

Diagnosis. *Pleurota tricolor* is characterized by the unicolorous costal half of the forewing. It is externally remotely similar to *P. insignella* (Fig. 24), of which only the male holotype is known from the High Atlas mountains at an altitude of 3100–3200 m. The smaller size, longer labial palpus, differently coloured forewing (ochreous brown in *P. tricolor*, grey in *P. insignella*), and differences in the male genitalia (broader apical half of gnathos, shorter valval lobe, and especially markedly longer posterior lobe of juxta) distinguish *P. tricolor* from *P. insignella*. Females of both species are unknown.

Molecular diagnosis. Seven specimens of *P. tricolor* were sequenced, resulting in 658 bp, full-length DNA barcode fragments for five specimens, and fragments of 632 bp and 611 bp for two specimens. The nearest neighbour to *P. tricolor* is *P. pellicolor* with a 7.65% divergence. The barcodes of *P. tricolor* exhibit 1.17 % maximum intraspecific variation (Table 1). Consequently, the results support the status of *P. tricolor* as a distinct species.

Description. Adult. Wingspan 17.5–21.0 mm. Labial palpus white, long, laterally and ventrally mixed with brown and dark brown, at base of 3rd segment dark brown stripe, 7.9 x as long as diameter of eye (1st and 2nd segments), 3rd segment 0.26 x length of 1st and 2nd segments. Antenna pale grey. Frons, collar and tegula white, thorax mixed with pale ochre. Forewing tricolored; costal and subcostal lines fused, ochreous brown to brown, extending from base to apex, slightly expanded towards apex, edged distinctly; dorsal half paler, suffused with ochre and white scales; median line white, extending from base almost to apex, lower edge indistinct, apically scattered with ochre scales. Fringe pale brown. Hindwing brownish grey, fringe concolorous, apically paler. Abdomen slightly lustrous, grey, each segment with transverse row of ochre scales.

Male genitalia. Uncus thimble-shaped dorsoventrally, lined with several long and short bristles. Gnathos 1.5 x as long as uncus, funnel-shaped dorsoventrally, slightly bulged medially in lateral aspect, above covered with scobination. Valva elongate, moderately narrow, upwards oblique; sacculus covered with long bristles. Anterior extension of juxta straight, narrow; median part parallel-sided; posterior lobe reaching apex of uncus, apex with a small tooth; valval lobe elongate, outer margin narrowly folded, lined with several short bristles. Phallus curved, parallel-sided, apex blunt, with one weakly sclerotized cornutus surrounded by numerous tiny spines.



FIGURES 8–15. Adults of *Pleurota* spp. **8–9.** *P. tricolor* sp. nov. 8. ♂ paratype. 9. ♂ paratype. **10.** *P. goundafella* Zerny. **11.** *P. pellicolor* sp. nov., ♂ holotype. **12–13.** *P. lacteella* sp. nov. 12. ♂ holotype. 13. ♀ paratype. **14–15.** *P. moroccoensis* sp. nov. 14. ♂ holotype. 15. ♀ paratype. Scale bar 5 mm.

Female genitalia. Unknown.

Biology. Unknown. The specimens were collected at light, most of them at dawn. The flight period extends from the end of May to the end of June.

Distribution. Known only from a few closely situated localities in the High Atlas mountains at an altitude between 850–1120 m.

Derivation of name. The specific name refers to the coloration of the forewing.

TABLE 1. Interspecific mean K2P divergences of ten barcoded *Pleurota* spp., based on the analysis of the DNA barcode fragment of the COI gene. Maximum intraspecific variations in grey cells. Number of examined specimens in parentheses.

	<i>atl</i>	<i>lac</i>	<i>mor</i>	<i>och</i>	<i>pel</i>	<i>tri</i>	<i>ari</i>	<i>bit</i>	<i>gou</i>	<i>sta</i>
<i>atlasensis</i> (3)	0.46	8.48	9.71	1.71	8.24	10.81	8.3	8.1	7.25	5.58
<i>lacteella</i> (4)		0.46	8.11	7.79	7.82	9.82	9.94	9.88	8.49	7.86
<i>moroccoensis</i> (14)			0.34	8.47	7.23	10.31	10.09	9.87	7.64	7.15
<i>ochreopalpella</i> (4)				0	8.11	9.83	7.79	8.27	7.26	5.59
<i>pellicolor</i> (3)					0	7.65	9.47	8.62	6.12	7.27
<i>tricolor</i> (7)						1.17	11.23	10.38	8.17	7.75
<i>aristella</i> (1)							N	8.86	8.86	8.03
<i>bitrubicella</i> (1)								N	8.8	8.32
<i>goundafella</i> (3)									0	6.85
<i>staintoniella</i> (4)										0.46

***Pleurota pellicolor* Tabell, sp. nov.**

Barcode Index Number: BOLD:ADI4007

Table 1, Figs. 11, 37, 48

Type material. Holotype ♂ (DNA sample 25565 Lepid Phyl): Morocco, Ouarzazate Prov., 1 km ESE Aguelmouss, N31.26232 W7.39616, 3.VII.2016, 2150 m, J. Tabell leg. (coll. MZH), BOLD sample ID: MM25565. Paratypes: 2 ♂ (GP 5715 J. Tabell, DNA sample 25566 Lepid Phyl; DNA sample 25564 Lepid Phyl), with same collecting data as holotype (coll. TAB).

Diagnosis. *Pleurota pellicolor* is characterized by an ochre forewing with indistinctly edged narrow pale ochre costal and median lines. In the male genitalia, the shape of uncus and the beak-shaped gnathos are characteristic.

Molecular diagnosis. All three specimens of *P. pellicolor* were sequenced, resulting in 658 bp, full-length DNA barcode fragments for two specimens, and a fragment of 573 bp for one specimen. The nearest neighbour to *P. pellicolor* is the morphologically distinctive *P. gallicella* with a 5.66% divergence. The barcodes of *P. pellicolor* exhibit no intraspecific variation (Table 1).

Description. Adult. Wingspan 24–25 mm. Labial palpus pale brown, mixed white and brown, ventrally widely dark brown, laterally with a small dark brown apical spot, long, about 7.4 x as long as diameter of eye (1st and 2nd segments), 3rd segment long, 0.33 x length of 1st and 2nd segments. Scape dark brown, flagellum brown. Head white, tinged with pale brown, tegula and thorax concolorous with forewing. Forewing pale ochreous brown, apex slightly darker, costa narrowly pale ochre; subcostal line broad, parallel-sided, yellowish brown, extending from base to apex; two indistinct off-white narrow median lines. Fringe brown. Hindwing grey, fringe brown. Abdomen slightly lustrous, pale grey, each segment with transverse row of ochre scales.

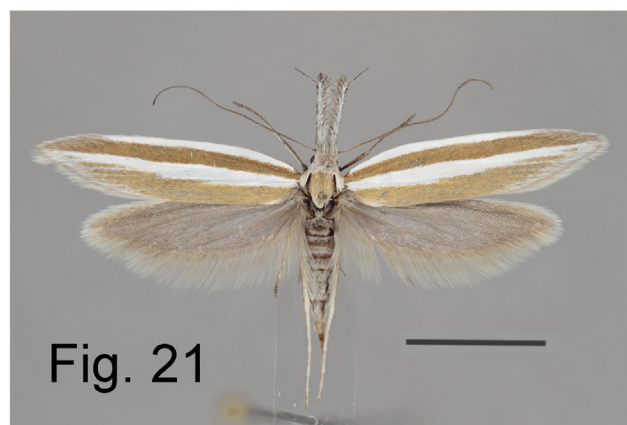
Male genitalia. Uncus bell-shaped dorsoventrally, lined with several long bristles, proximal margin sinuous. Gnathos 1.5 x as long as uncus, funnel-shaped dorsoventrally, beak-shaped in lateral aspect, apical half moderately narrow, apex pointed. Valva upwards oblique, ventral margin evenly curved; sacculus narrow. Anterior extension of juxta straight, narrow; median part oval; posterior lobe narrow, reaching uncus; valval lobe elongate, base broad, apical part broadly folded, lined with several small nodules and short bristles. Vinculum U-shaped. Phallus curved, apex tapered, with one small elongate plate-shaped cornutus surrounded by numerous tiny spines.

Female genitalia. Unknown.

Biology. Unknown. The moths were collected at the beginning of July at light at dawn. The habitat is a steep slope at an elevation of 2150 m.

Distribution. Known from a single locality in the High Atlas mountains.

Derivation of name. The specific name refers to the coloration of forewing.



FIGURES 16–21. Adults of *Pleurota* spp. **16–17.** *P. ochreopalpella* **sp. nov.** 16. ♂ paratype. 17. ♀ paratype. **18–19.** *P. atlasensis* **sp. nov.** 18. ♂ holotype. 19. ♀ paratype. **20–21.** *P. staintoniella* Baker. 20. ♂. 21. ♀. Scale bar 5 mm.

***Pleurota lacteella* Tabell, sp. nov.**

Barcode Index Number: BOLD:ACW1892

Table 1, Figs. 12, 13, 38, 43, 48

Type material. Holotype ♂ (DNA sample 23743 Lepid Phyl): Morocco, Anti-Atlas, Tiznit Prov., 19.5 km SW Taфраout, 1010 m, N29.60585 W9.13183, 14.IV.2016, J. Tabell leg. (coll. MZH), BOLD sample ID: MM23743.

Paratypes: 1 ♂ (DNA sample 23742 Lepid Phyl), same collecting data as holotype (coll. TAB); 1 ♂ (GP 5490 J. Tabell, DNA sample 23738 Lepid Phyl), Morocco, Anti-Atlas, Tiznit Prov., 24 km SW Taфраout, 1125 m, N29.58058 W9.17267, 13.IV.2016, J. Tabell leg. (coll. TAB); 1 ♂, Morocco, 1400 m, 25 km N Ar-Rachidia, 15.IV.1989, Zool. Mus. Copenh. Exp. (coll. ZMUC); 1 ♀ (GP 5429 J. Tabell, DNA sample 23713 Lepid Phyl), Morocco, Souss-Massa-Draa, Ouarzazate, 30°50', -6°49', 11.V.2011, 1140 m, Anssi & Jaakko Kullberg (coll. MZH).

Diagnosis. *Pleurota lacteella* is characterized by a broad white median line in the forewing. Externally it resembles *P. moroccoensis*, but the forewing is slightly broader, and the white median area is larger, forming short apical lines. In the male genitalia, a broader uncus and gnathos, a broader median section of juxta, a longer posterior lobe, and a shorter phallus distinguish *P. lacteella* from *P. moroccoensis*. The female genitalia of *P. lacteella* have broader posterior signa.

Molecular diagnosis. Four specimens of *P. lacteella* were sequenced, resulting in 658 bp, full-length DNA barcode fragments for all specimens. The nearest neighbour to *P. lacteella* is an undetermined Corsican species with a 7.2% divergence. The barcodes of *P. lacteella* exhibit 0.46% maximum intraspecific variation (Table 1).

Description. Adult. Wingspan 20–26 mm. Labial palpus off-white, laterally and ventrally mixed with brown scales, about 6.5 x as long as diameter of eye (1st and 2nd segments), 3rd segment 0.29 x length of 1st and 2nd segments. Scape brown, flagellum grey, basally with white scales. Frons, collar and tegula white, mixed pale ochre, thorax pale ochre. Costal line white, moderately narrow, from near base to 0.83; subcostal line yellowish brown, evenly slightly expanded towards apex, distinctly edged; median line broad, white; median area with four more or less distinct white narrow lines; dorsal 0.5 pale beige, suffused with white scales. Fringe white. Hindwing pale grey, margin brown, fringe pale brown, apically paler. Abdomen slightly lustrous, pale grey, each segment with transverse row of ochre scales.

Male genitalia. Uncus thimble-shaped dorsoventrally, lined with several bristles of different length, apex blunt. Gnathos 1.7 x as long as uncus, dorsoventrally elongate, funnel-shaped, gradually tapered towards rounded apex, medially covered with small scale-like scobination. Valva elongate, moderately narrow, upwards oblique, ventral margin slightly sinuous; sacculus moderately narrow, covered with long bristles. Juxta long; anterior extension straight, median part broad, posterior lobe extended to uncus, apex armed with a small tooth; valval lobe elongate, outer margin broadly folded, lined with several bristles. Vinculum U-shaped. Phallus curved, with one robust plate-shaped cornutus surrounded by numerous tiny spines.



Fig. 22



Fig. 23

FIGURES 22–23. Type specimen and label data of *Pleurota goundafella* Zerny. 22. ♂ holotype. 23. Label data.

Female genitalia. Papillae anales oval, covered with bristles of different length. Apophyses long; posterior apophysis 6 x as long as papillae anales and 1.75 x as long as anterior apophysis. Segment 8 longitudinally elongated, rectangular, membranous, dorsolaterally reinforced by sclerotized band, distal 0.5 ventrally sparsely

covered with bristles, ventral longitudinal sclerotization narrow, as long as segment 8, branch of apophysis anterioris club-shaped. Antrum tubular, slightly shorter than segment 8, posteriorly wider, membranous, anteriorly sclerotized. Ductus bursae membranous, as long as antrum, broad. Corpus bursae with one robust arched signum with two narrow and long sclerotized thorn-like protuberances, and two broad leaf-shaped signa.

Biology. Unknown. The flight period extends from mid-April to mid-May.

Distribution. Known only from few localities in the High Atlas and Anti-Atlas mountains at an altitude between 1010 m and 1400 m.

Derivation of name. The specific name refers to the coloration of forewing, dominated by milk-white colour.

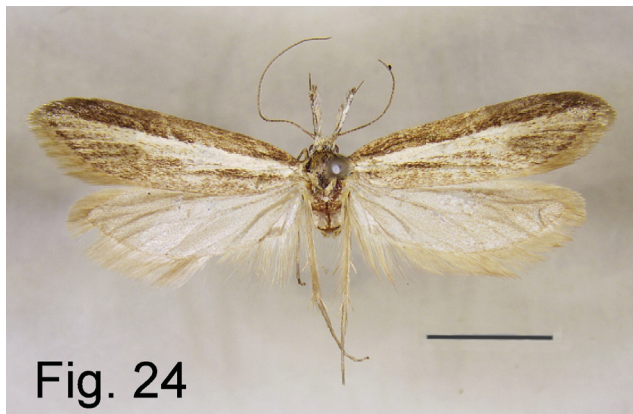


Fig. 24

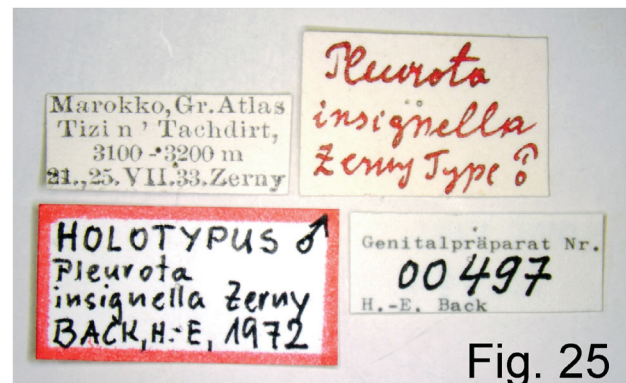


Fig. 25



Fig. 26

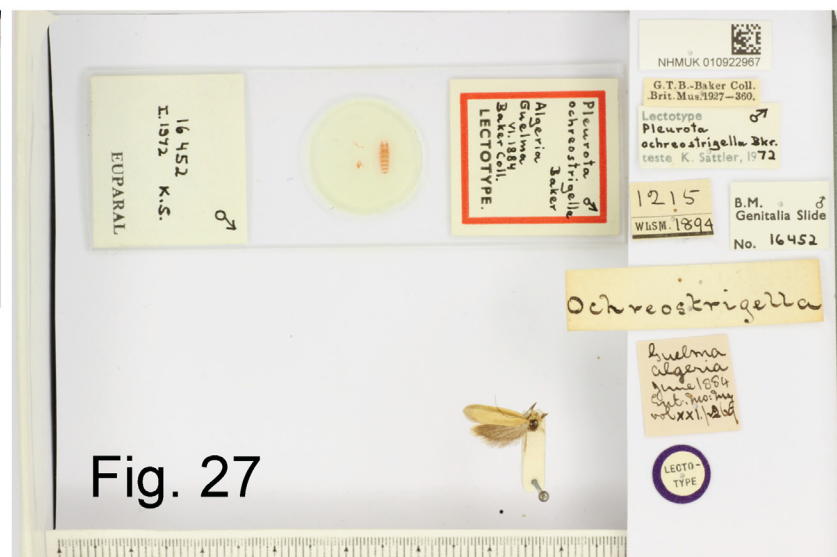


Fig. 27



Fig. 28

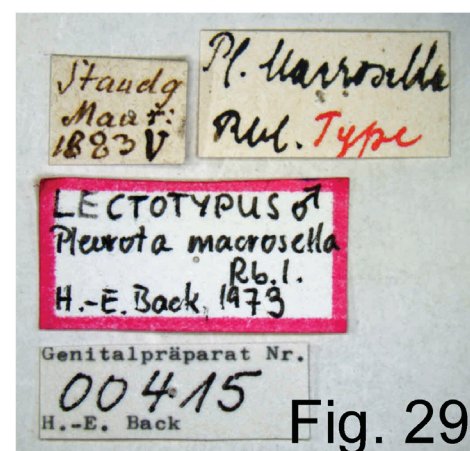


Fig. 29

FIGURES 24–29. Type specimens and labels of *Pleurota* spp. 24–25. *P. insignella* Zerny. 24. ♂ holotype. 25. Label data. 26–27. *P. ochreostrigella* Baker. 26. ♂ lectotype. 27. Label data. 28–29. *P. macrosella* Rebel. 28. ♂ lectotype. 29. Label data. Scale bar 5 mm.



Fig. 30



Fig. 31



Fig. 32



Fig. 33



Fig. 34

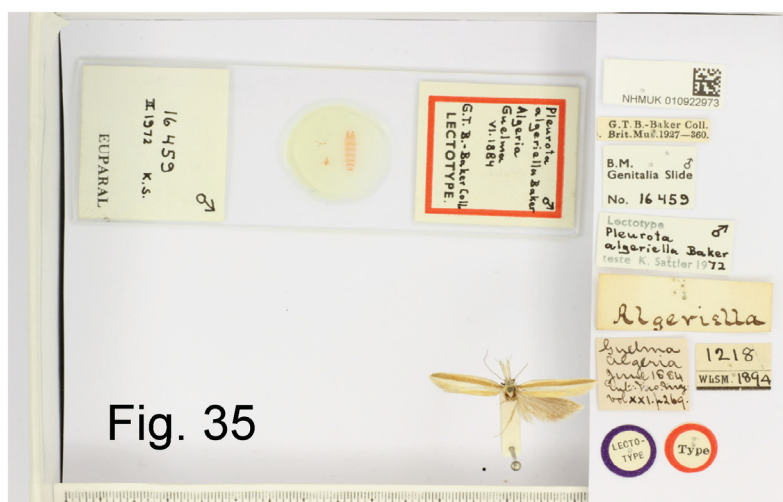


Fig. 35

FIGURES 30–35. Type specimens and labels of *Pleurota* spp. 30–31. *P. staintoniella* Baker. 30. ♂ lectotype. 31. Label data. 32–33. *P. mauretania* Baker. 32. ♂ lectotype. 33. Label data. 34–35. *P. algeriella* Baker. 34. ♂ lectotype. 35. Label data.



FIGURES 36–37. Male genitalia. 36. *P. tricolor* **sp. nov.**, GP 5506 J. Tabell. 37. *P. pellicolor* **sp. nov.**, GP 5715 J. Tabell.



FIGURES 38-39. Male genitalia. 38. *P. lacteella* **sp. nov.**, GP 5490 J. Tabell. 39. *P. moroccoensis* **sp. nov.**, GP 5396 J. Tabell.

***Pleurota moroccoensis* Tabell, sp. nov.**

Barcode Index Number: BOLD:ACW1895

Table 1, Figs. 14, 15, 39, 44, 48

Type material. Holotype ♂ (DNA sample 24508 Lepid Phyl): Morocco, Taroudant Prov., 19 km NNE Ouled Berhil, N30.79190 W8.39049, 1000 m, 2.V.2013, J. Tabell leg. (coll. MZH), BOLD sample ID: MM24508. Paratypes: 3 ♂ (GP 5313 J. Tabell, DNA sample 23676 Lepid Phyl; DNA sample 23675 Lepid Phyl), same collecting data as holotype; 1 ♂ (GP 5074 J. Tabell, DNA sample 23668 Lepid Phyl), Morocco, Taroudant Prov., 22 km NNE Ouled Berhil, 1340 m, 1.V.2013, N30.82847 W8.40095, J. Tabell leg.; 1 ♂ (GP 5396 J. Tabell, DNA sample 23674 Lepid Phyl), Morocco, 2 km NW Azrou, 1220 m, N33.47397 W5.24710, 6.V.2013, J. Tabell leg.; 1 ♂ (DNA sample 23747 Lepid Phyl), Morocco, Agadir Prov., 8 km NNW Agadir, 140 m, N30.49457 W9.62407, 11.IV.2015, J. Tabell leg.; 1 ♀ (DNA sample 23737 Lepid Phyl), Morocco, Anti-Atlas, Tiznit Prov., 24 km SW Tafraout, 1125 m, N29.58058 W9.17267, 13.IV.2015, J. Tabell leg.; 1 ♂ (DNA sample 23736 Lepid Phyl), Morocco, High Atlas, Taroudant Prov., 1130 m, 5 km N Tafingoult, N30.805883 W8.396052, 15.IV.2015, J. Tabell leg.; 3 ♂ (GP 5448 J. Tabell, DNA sample 23748 Lepid Phyl; GP 5441 J. Tabell, DNA sample 23733 Lepid Phyl; GP 5888 J. Tabell, DNA sample 23735 Lepid Phyl), 2 ♀ (GP 5456 J. Tabell, DNA sample 23734 Lepid Phyl), Morocco, High Atlas, Taroudant Prov., 1200 m, 6 km N Tafingoult, N30.812573 W8.396312, 16.IV.2015, J. Tabell leg.; 2 ♂, Morocco, Ifrane Prov., 3 km NNW Azrou, 1210 m, N33.446424 W5.24528, 14.V.2016, J. Tabell leg.; 16 ♂ (GP 5701 J. Tabell), Morocco, Ifrane Prov., 3 km NNW Azrou, 1210 m, N33.46424 W5.24528, 16.V.2016, J. Tabell leg.; 1 ♂ (DNA sample 25814 Lepid Phyl), 1 ♀ (GP 5711 J. Tabell, DNA sample 25813 Lepid Phyl), Morocco, Settât Prov., 2.5 km E Sidi Said Maachou, 100 m, N33.14137 W8.09181, 18.V.2016, J. Tabell leg. (colls. MZH and TAB).

Diagnosis. Externally *P. moroccoensis* is a rather variable species. It is similar to *P. algeriella* Baker, 1885 (Fig. 34), *P. macrosella* (Fig. 28) (both with type localities in north-eastern Algeria), *P. lacteella*, and *P. ochreopalpella*. In *P. moroccoensis* the median line is broader than in *P. macrosella*, but narrower than in *P. lacteella*, and the costal line is longer and broader than in *P. ochreopalpella*. Diagnostic features in male genitalia are the shape of uncus (longer in *P. ochreopalpella* and *P. macrosella*, broader in *P. lacteella*), gnathos (shorter in *P. algeriella* and *P. lacteella*), posterior lobe of juxta (longer in *P. ochreopalpella* and *P. macrosella*, shorter in *P. algeriella*), and valval lobe (longer in *P. macrosella*, larger and more sclerotized in *P. ochreopalpella*). In the female genitalia, the branch of the apophysis anterioris is club-shaped in *P. moroccoensis* and *P. lacteella*, stripe-shaped in *P. atlasensis*; the ventral longitudinal sclerotization is narrowest in *P. moroccoensis*, broadest in *P. lacteella*; the anterior section of the ductus bursae is swollen in *P. lacteella*, parallel-sided in *P. moroccoensis* and *P. atlasensis*; the posterior signa are small in *P. moroccoensis*, broad in *P. lacteella*, narrow and elongated in *P. atlasensis*.

Molecular diagnosis. Fourteen specimens of *P. moroccoensis* from different Moroccan localities were sequenced, resulting in 658 bp, full-length DNA barcode fragments for 13 specimens, and a fragment of 594 bp for one specimen. The nearest neighbour to *P. moroccoensis* is *P. staintoniella* with a 7.15% divergence. The barcodes of *P. moroccoensis* exhibit 0.34% maximum intraspecific variation (Table 1).

Description. Adult. Wingspan 19–24 mm. Labial palpus pale beige, laterally and ventrally mixed white and brown, dorsolaterally with a dark brown apical spot, long, about 7.3 x as long as diameter of eye (1st and 2nd segments), 3rd segment long, 0.34 x length of 1st and 2nd segments. Antenna brown. Head, tegula and thorax concolorous with forewing. Forewing pale beige, apically a hue of short white stripes; costal line white, extending almost from base to 0.8; subcostal line yellowish brown, slightly expanded towards apex; median line white, dorso-medially with a short dent. Fringe pale beige to white, darker medially, forming a line parallel to indistinct fringe line. Hindwing pale grey, fringe pale brownish grey, white at outer margin. Abdomen slightly lustrous, pale grey, each segment with transverse row of ochre scales.

Male genitalia. Uncus bell-shaped dorsoventrally, shorter than gnathos, lined with several bristles, apex blunt. Gnathos funnel-shaped dorsoventrally, 1.7 x as long as uncus, medially covered with scobination above, apex laterally shallowly beak-shaped. Tegumen large, anterior margins arched. Valva elongate, thimble-shaped, upwards oblique, ventral margin evenly curved, costa straight; sacculus narrow. Posterior lobe of juxta long, extended beyond apex of uncus; valval lobe oval, gutter-shaped apically, covered with short bristles. Phallus curved, parallel-sided, with a bundle of numerous spines and one plate-shaped angular cornutus, dorsal margin at apex lined with several small spines.

Female genitalia. Papillae anales ovoid, covered with bristles of different length. Apophyses long; posterior apophysis 5.8 x as long as papilla analis and 1.4 x as long as anterior apophysis. Segment 8 elongated longitudinally, rectangular, membranous, dorsolaterally reinforced by sclerotized bands, distal half ventrally sparsely covered with bristles, caudal margin concave, ventral longitudinal sclerotization narrow, slightly shorter than segment 8, branch of apophysis anterioris club-shaped. Antrum tubular, parallel-sided, slightly shorter than segment 8, membranous, anterior 0.33 slightly tapered and sclerotized. Ductus bursae membranous. Corpus bursae ovoid, with one robust arched signum with two long, narrow, sclerotized thorn-like protuberances, and two tiny leaf-shaped signa.

Biology. Unknown. The adults have been captured in April and May at light, a few specimens also by sweeping vegetation during morning.

Distribution. Morocco, widely distributed in the Middle and High Atlas mountains, at an altitude between 100 and 1210 m.

Derivation of name. The specific epithet refers to the country of Morocco.

***Pleurota ochreopalpella* Tabell, sp. nov.**

Barcode Index Number: BOLD:ADI5171

Table 1, Figs. 16, 17, 40, 46, 48

Type material. Holotype ♂ (GP 5693 J. Tabell, DNA sample 25574 Lepid Phyl): Morocco, Taourirt Prov., 3 km NNE Debdou, 880 m, N34.00987 W3.02433, 11.V.2016, J. Tabell leg. (coll. MZH), BOLD sample ID: MM25574. Paratypes: 7 ♂ (GP 5704 J. Tabell, DNA sample 25573 Lepid Phyl), 3 ♀ (GP 5709 J. Tabell, DNA sample 25575 Lepid Phyl; DNA sample 25576 Lepid Phyl), same collecting data as holotype (colls. MZH and TAB).

Diagnosis. Externally *P. ochreopalpella* is similar to *P. moroccoensis*, but the costal line is narrower. A long gnathos and strongly sclerotized valval lobe in male genitalia distinguish *P. ochreopalpella* from related species. In the female genitalia, the narrow ductus bursae and large corpus bursae are characteristic.

Molecular diagnosis. Four specimens of *P. ochreopalpella* were sequenced, all of which yielded a 658 bp, full-length DNA barcode fragment. The nearest neighbour to *P. ochreopalpella* is *P. atlasensis* with a 1.71% divergence. The barcodes of *P. ochreopalpella* exhibit no intraspecific variation (Table 1).

Description. Adult. Wingspan 22.0–26.5 mm. Labial palpus off-white to pale ochre, ventrally mixed brown and white, laterally with a dark brown apical spot, long, about 8.1 x as long as diameter of eye (1st and 2nd segments), 3rd segment long, 0.37 x length of 1st and 2nd segments. Antenna brown, hairy in male. Head, tegula and thorax off-white to pale brown. Forewing pale brown, termen irrorated with darker scales; costal line narrow, extending almost from base to 0.8, basally white, distally pale brown; subcostal line darker than dorsal half of forewing; median line white, extending from base to apex, expanded medially with two steps at dorsal margin, apical 0.4 narrow. Fringe pale brown, apically off-white. Hindwing grey, fringe pale grey, at outer margin white. Abdomen slightly lustrous, brownish grey, each segment with transverse row of ochre scales.

Male genitalia. Uncus thimble-shaped dorsoventrally, lined with several short and few long bristles, apical half more strongly sclerotized. Gnathos about twice as long as uncus, funnel-shaped dorsoventrally, medially covered with small scales, apex blunt. Valva upwards oblique, ventral margin slightly convex, costa straight; sacculus narrow. Anterior extension of juxta short, bulged; median part chalice; posterior lobe narrow, reaching the apex of uncus; valval lobe elongate, strongly sclerotized, base broad, outer margin weakly sinuous, distally covered with several small nodules and short bristles. Vinculum U-shaped. Phallus curved, apex tapered, with one plate-shaped cornutus surrounded by numerous tiny spines, apical 0.2 dorsally covered with small spines and nodules.

Female genitalia. Papillae anales ovoid, covered with bristles of different length. Apophyses long; posterior apophysis 5.5 x as long as papilla analis and 1.7 x as long as anterior apophysis. Segment 8 elongated longitudinally, rectangular, membranous, dorsolaterally reinforced by sclerotized band, distally sparsely covered with bristles, proximal margin dorsally reinforced by two sclerotized bands; ventral sclerotization narrow, slightly shorter than segment 8. Antrum tubular, parallel-sided, shorter than segment 8, membranous, anterior 0.33 tapered and sclerotized. Ductus bursae membranous, as long as antrum, slightly expanded towards corpus bursae. Corpus bursae ovoid, with one robust arched signum bearing two long, narrow, sclerotized thorn-like protuberances, and two elongate leaf-shaped signa.

Biology. Unknown. The moths were collected in May at light, together with *P. staintoniella*. The habitat is a small calcareous hill.

Distribution. Known only from a single locality in north-eastern Morocco.

Derivation of name. The specific name refers to the colour of labial palpus.

***Pleurota atlasensis* Tabell, sp. nov.**

Barcode Index Number: BOLD:ADA3031

Table 1, Figs. 18, 19, 41, 45, 48

Type material. Holotype ♂ (GP 5507 J. Tabell, DNA sample 24612 Lepid Phyl): Morocco, High Atlas, 6 km NW Ouirgane, N31°12'32'', W8°4'48'', 30.V.2015, 850 m, C. Hviid, O. Karsholt & K. Larsen (coll. ZMUC), BOLD sample ID: MM24612. Paratypes: 1 ♂ (DNA sample 24614 Lepid Phyl), Morocco, High Atlas, 9 km NW Ouirgane, N31°12'24'', W8°4'33'', 30.V.–3.VI.2015, 970 m, C. Hviid, O. Karsholt & K. Larsen (coll. TAB); 1 ♀ (GP 5545 J. Tabell, DNA sample 24613 Lepid Phyl), Morocco, High Atlas, 2 km N Asni, N31°15'54'', W7°58'64'', 31.V.2015, 1125 m, C. Hviid, O. Karsholt & K. Larsen (coll. TAB).

Diagnosis. Broader wings distinguish *P. atlasensis* from other similarly coloured species, such as *P. macrosella*, *P. staintoniella* (known from north-western Algeria and north-eastern Morocco), and *P. ochreopalpella*, the last known from northeastern Morocco. The male genitalia are similar to those of *P. macrosella*, but the uncus is shorter, the posterior lobe broader, the valval lobe shorter, and the cornutus larger. In the female genitalia, the short, narrow branch of apophysis anterioris and narrow anterior and posterior signa are characteristic.

Molecular diagnosis. All three specimens of *P. atlasensis* were sequenced, and each yielded in a 658 bp, full-length DNA barcode fragment. The nearest neighbour to *P. atlasensis* is *P. ochreopalpella* with a 1.71% divergence. The barcodes of *P. atlasensis* exhibit 0.46 % maximum intraspecific variation (Table 1).

Description. Adult. Wingspan 23–25 mm. Labial palpus 7.4 x as long as diameter of eye (1st and 2nd segments), 3rd segment 0.37 x length of 1st and 2nd segments, off-white, laterally and ventrally brown, mixed with white and brown scales, apical lateral spot blackish brown, large. Antenna pale brown. Head, tegula and thorax off-white, mixed with pale beige. Forewing moderately broad as compared with related species (width to length ratio 0.25), pale yellowish beige; costal line white, extending almost from base to 0.8; subcostal line yellowish beige, slightly expanded towards apex; median line white, moderately broad, nearly parallel-sided. Fringe pale beige. Hindwing pale grey, fringe pale brownish grey, white at outer margin. Abdomen slightly lustrous, pale grey, each segment with transverse row of ochre scales.

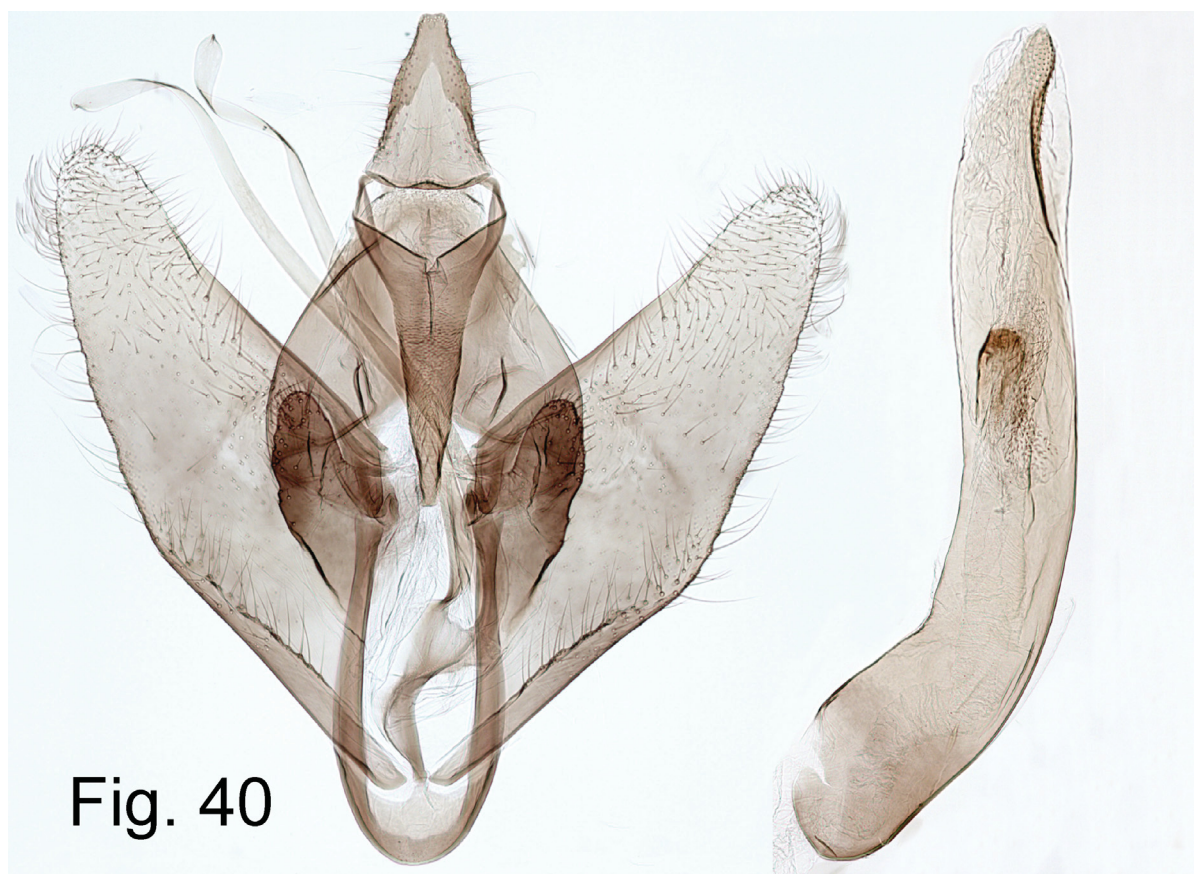
Male genitalia. Uncus thimble-shaped dorsoventrally, lined with several short and few long bristles, apical half more strongly sclerotized. Gnathos almost twice as long as uncus, funnel-shaped dorsoventrally, medially covered with small scales, apex blunt. Valva upwards oblique, ventral margin slightly convex, costa straight; sacculus narrow. Anterior extension of juxta narrow, straight; median part chalice; posterior lobe reaching apex of uncus. Valval lobe elongate, distally covered with several small nodules and short bristles, ventral margin narrowly folded, dorsal margin distinctly concave. Vinculum U-shaped. Phallus curved, apex tapered, with one robust plate-shaped cornutus surrounded by numerous tiny spines, apical 0.2 dorsally covered with small spines.

Female genitalia. Papillae anales ovoid, covered with bristles of different length. Apophyses long; posterior apophysis 6 x as long as papilla analis and 1.55 x as long as anterior apophysis. Segment 8 elongated longitudinally, rectangular, membranous, dorsolaterally reinforced by sclerotized band, ventrally sparsely covered with bristles at apex, ventral longitudinal sclerotization narrow, slightly shorter than segment 8, branch of anterior apophysis narrow and short. Antrum tubular, parallel-sided, slightly shorter than segment 8, membranous, anterior 0.33 more sclerotized. Ductus bursae membranous, slightly expanded towards corpus bursae. Corpus bursae ovoid, with one robust arched signum, all protuberances narrow, and two elongate leaf-shaped signa.

Biology. Unknown. The specimens were collected during a short period in May and June at light.

Distribution. Known only from a few closely situated localities in the High Atlas mountains at altitudes between 850 m and 1125 m.

Derivation of name. The specific name refers to the geographical origin of the species, the Atlas mountains.



FIGURES 40–41. Male genitalia. 40. *P. ochreopalpella* **sp. nov.**, GP 5704 J. Tabell. 41. *P. atlasensis* **sp. nov.**, GP 5507 J. Tabell.

***Pleurota staintoniella* Baker, 1888**

Barcode Index Number: BOLD:ADI3642

Table 1, Figs. 20–21, 30–31, 42, 47, 48

Material studied. 12 ♂ (GP 5700 J. Tabell, DNA sample 25570 Lepid Phyl; GP 5730 J. Tabell; DNA sample 25571 Lepid Phyl), 4 ♀ (GP 5710 J. Tabell, DNA sample 25569 Lepid Phyl; GP 5899 J. Tabell, DNA sample 25572 Lepid Phyl): Morocco, Taourirt Prov., 3 km NNE Debdou, 880 m, N34.00987 W3.02433, 11.V.2016, J. Tabell *leg.* (coll. TAB). The male lectotype (Algeria, Sebdou) is deposited in NHMUK.

Diagnosis. Characterized by a unicolorous brown or yellowish brown forewing with white costal and median lines. In the male genitalia, a narrow and long phallus, and a long, well-sclerotized valval lobe of the juxta are the distinguishing features. In the female genitalia, extremely long apophyses and broad projections of the posterior signum are characteristic.

Molecular diagnosis. Four specimens of *P. staintoniella* were sequenced, all of which yielded 658 bp DNA barcode fragments. The nearest neighbour to *P. staintoniella* is an undetermined Moroccan species (females only available) with a 5.09% divergence. The barcodes of *P. staintoniella* exhibit 0.46 maximum intraspecific variation (Table 1).



FIGURE 42. Male genitalia. *P. staintoniella* Baker, GP 5700 J. Tabell.

Description. Adult. Wingspan 19–25 mm. Labial palpus off-white, mixed brown, long, about 6.7 x as long as diameter of eye (1st and 2nd segments), 3rd segment long, 0.38 x length of 1st and 2nd segments. Antenna brown. Head whitish tinged pale brown, tegula and thorax concolorous with forewing. Forewing pale yellowish brown; costal line white, narrow, from near apex to 0.8; median line white, extending from base to apex, slightly expanded medially, dorso- medially with two shallow notches, apical 0.4 narrow. Fringe brown mixed white. Hindwing brownish grey, margin brown, fringe brown, apically paler. Abdomen slightly lustrous, greyish brown, each segment with transverse row of ochre scales.



Fig. 43



Fig. 44



Fig. 45

FIGURES 43–45. Female genitalia. 43. *P. lacteella* **sp. nov.**, GP 5429 J. Tabell. 44. *P. moroccoensis* **sp. nov.**, GP 5456 J. Tabell. 45. *P. atlasensis* **sp. nov.**, GP 5545 J. Tabell.



Fig. 46



Fig. 47

FIGURES 46–47. Female genitalia. 46. *P. ochreopalpella* sp. nov., GP 5898 J. Tabell. 47 *P. staintoniella* Baker, ♀ genitalia, GP 5899 J. Tabell.

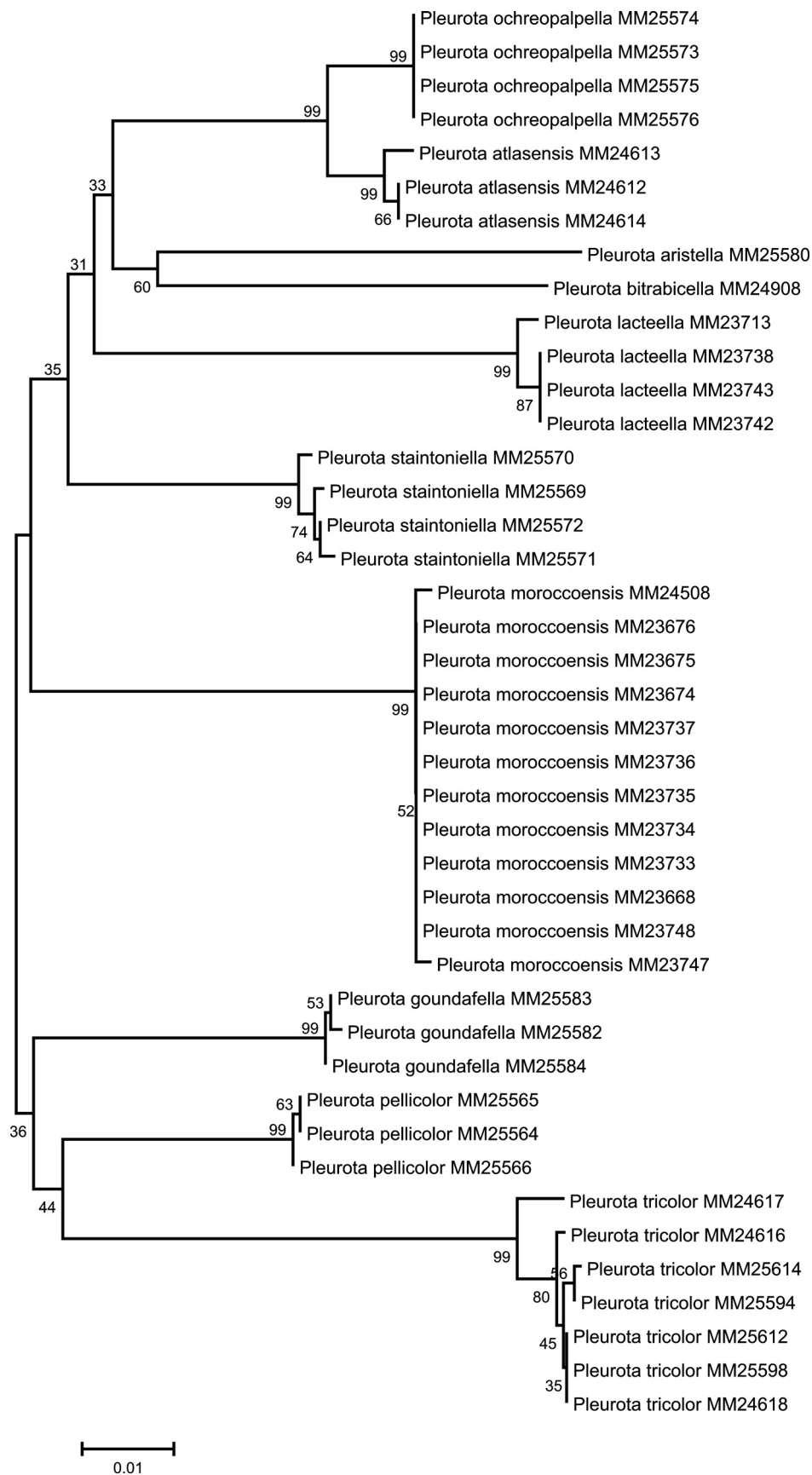


FIGURE 48. Neighbour joining tree, conducted under Kimura 2-parameter model, of ten taxa of *Pleurota aristella* group, based on sequences of *COI* gene. The values by the nodes indicate node bootstrap supports as based on 500 replicates.

Male genitalia. Uncus thimble-shaped dorsoventrally, lined with several long bristles, apical 0.5 more strongly sclerotized. Gnathos long, almost 2 x as long as uncus, funnel-shaped dorsoventrally, beak-shaped in lateral aspect, medially covered with small spines. Valva upwards oblique, ventral margin slightly convex, costa straight; sacculus narrow and long. Anterior extension of juxta straight; median part chalice; posterior lobe very long, exceeding apex of uncus; valval lobe long, club-shaped, smooth, distally covered with several small nodules and short bristles. Vinculum U-shaped. Phallus curved, parallel-sided, apex blunt, with one plate-shaped cornutus, apical 0.14 dorsally covered with small nodules.

Female genitalia. Papillae anales ovoid, covered with bristles. Apophyses very long; posterior apophysis 5.5 x as long as papilla analis and 1.7 x as long as anterior apophysis. Segment 8 elongated longitudinally, rectangular, membranous, dorsolaterally reinforced by sclerotized band, ventrally sparsely covered with bristles, ventral longitudinal sclerotization narrow, slightly shorter than segment 8, branch of apophysis anterioris narrow and short. Antrum tubular, parallel-sided, shorter than segment 8, posteriorly membranous, anterior 0.33 tapered and sclerotized. Ductus bursae membranous, as long as antrum, slightly expanded towards corpus bursae. Corpus bursae ovoid with one robust arched signum with two long, narrow, sclerotized thorn-like protuberances, and two elongate leaf-shaped signa.

Biology. Unknown. In Morocco, the specimens were collected on a calcareous hill in May, together with *P. ochreopalpella*.

Distribution. Previously only known from Algeria. The distance between the Algerian type locality and Moroccan site is less than 200 km.

Acknowledgements

We thank the Kone Foundation, the Finnish Cultural Foundation, and the Academy of Finland for support in barcoding through the Finnish Barcode of Life initiative. Figures 26–27 and 30–35 are used with permission from Natural History Museum, London, UK, provided by David Lees, and figures 22–25 and 28–29 from the Naturhistorisches Museum, Vienna, Austria, provided by Sabine Gaal. We are also grateful to the staff of the Canadian Centre for DNA barcoding for sequencing the samples and continuous help in management our BOLD records.

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